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Bell Labs Innovations



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**ELECTRONIC FILING**

February 7, 2003

Marlene Dortch  
Office of the Secretary  
Federal Communications Commission  
445-12<sup>th</sup> Street, S.W.  
Washington, D.C. 20554

Re: In the Matter of Service Rules for Advanced Wireless Services in the  
1.7 GHz and 2.1 GHz Bands - WT Docket No. 02-353

Dear Ms. Dortch:

Attached please find the Comments of Lucent Technologies in response to the FCC's *Notice of Proposed Rulemaking* adopted on November 7, 2003 in the above referenced proceeding.

Should you have any questions regarding these comments, please contact Bob Hirsch of Lucent's Mobility Segment at 973-428-7794.

Sincerely,

/s/ Gena L. Ashe  
Corporate Counsel

Before the  
**Federal Communications Commission**  
Washington, D.C. 20554

In the Matter of	)	
	)	
Service Rules for Advanced Wireless	)	WT Docket No. 02-353
Services in the 1.7 GHz and 2.1 GHz	)	
Bands	)	
	)	

**COMMENTS OF LUCENT TECHNOLOGIES INC.**

Pursuant to Section 1.415 of the FCC's Rules and Regulations, Lucent Technologies respectfully submits its Comments in response to the *Notice of proposed Rulemaking* adopted on November 7, 2002 in the above-referenced proceeding). Lucent's Comments in this regard are limited to issues concerning band plan and matters associated with interference avoidance.

**Paired or Unpaired Blocks**

The Commission requests comments on whether the spectrum should be licensed using paired or unpaired blocks, or a combination of both. As the Commission is aware, the advanced wireless technology (3G) systems currently available (CDMA2000) or undergoing product trial (UMTS) are FDD systems and require the use of paired spectrum.<sup>1</sup> These systems are currently being deployed or are planned for deployment by U.S. operators. Accordingly, it is necessary that the Commission allocate paired blocks to accommodate the currently available 3G technologies.

The use of unpaired spectrum and the associated deployment of TDD systems adjacent to paired allocations has typically raised interference concerns and is considered problematic. Specifically, such allocations necessarily place opposite directions of transmission in adjacent spectrum and potentially generate interference from TDD transmit to FDD receive and FDD transmit into TDD receive. Historically, TDD systems have been used in low power, lower mobility applications, often within unlicensed spectrum. It is recognized that ongoing development efforts promise TDD systems that claim to operate without the interference concerns associated with current technology. If and when available, the recipient of a license for paired spectrum could deploy such a system in its licensed spectrum consistent with interference constraints such as limits on

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<sup>1</sup> In its Second Report and Order (FCC 02-304) at footnote 67, and in Para. 30 of the NPRM (FCC 02-305), the Commission states that cdma2000 requires a bandwidth of 7.5 MHz to provide the maximum data rate (2 Mbps) required by the IMT-2000 standard. This is incorrect. Cdma2000 provides data rates in excess of 2 Mbps in the nominal bandwidth of 1.25 MHz. Specifically CDMA20001xEV-DO provides a peak data rate of 2.4 Mbps in its downlink transmission path.

out of band emissions. Compliance with these limits may demand that a TDD operator implement guard bands of significant size within their licensed spectrum, adjacent to the boundary with FDD systems, or limit the TDD transmitter power.

It would appear, therefore, that the Commission should segment the allocated spectrum in paired blocks in order to accommodate the predominant technology that is and will be available to operators for their provision of advanced services. To the extent that TDD systems useable in large area, high mobility applications become available, such systems could be deployed in spectrum licensed in paired blocks. The Commission should avoid the allocation of unpaired blocks as such spectrum may remain unused (stranded) should effective TDD systems be unavailable or not selected for deployment by licensed operators.

### **Block Size**

The Commission seeks comment on the appropriate block size and whether all blocks within the spectrum allocated for advanced wireless services should be equal. As noted in previous proceedings (e.g., Docket 00-258), a bandwidth of at least 5 MHz is required to accommodate all of the 3G radio interfaces. Accordingly, the Commission should consider paired increments of 5 MHz resulting in licenses of  $2 \times 5n$  MHz. Larger block sizes of, for example,  $2 \times 10$  MHz or  $2 \times 15$  MHz are desirable as they can accommodate future, higher data rates, and provide operators with additional capacity, and, importantly, with greater flexibility. Further, the Commission should follow the format it has most often defined in previous allocations, and prescribe blocks that are not all the same bandwidth. The availability of blocks of different size will allow operators to better accommodate their needs, particularly the capacity they need to serve and the mix of services (e.g., data/voice) they may wish to offer. As an example, the Commission may wish to consider two blocks of  $2 \times 10$  MHz and one block of  $2 \times 15$  MHz.

### **Symmetric or Asymmetric Allocations**

The Commission asks if paired blocks should be defined with symmetric or asymmetric bandwidths. Lucent believes the Commission should allocate spectrum on a symmetric, rather than asymmetric basis. Importantly, all the IMT-2000 standards that use FDD operate in symmetric paired bands. Consequently, if the Commission were to adopt asymmetric band pairs, a licensee would be unable to employ current standardized technology and utilize its entire assigned spectrum. An allocation of asymmetric blocks would therefore result in unused, stranded spectrum.

Further, asymmetric band pairs may be unnecessary because much advanced service traffic is likely to remain symmetrical. That is, while advanced wireless data services, such as wireless internet access, may become increasingly more asymmetric, it is likely that symmetric voice traffic will continue to dominate and constitute a large percentage of operator traffic. Moreover, other potential advanced wireless data services, such as

video conferencing, may likely load data networks in a symmetrical fashion and require symmetric operation.

In addition, asymmetric traffic can be supported within symmetrical band pairings. Higher order modulation techniques used to support asymmetrical data flows in symmetrical radio links can be deployed in the uplink and/or downlink directions to provide higher data rates. Indeed, CDMA2000 1xEV-DO, which uses symmetric paired spectrum, supports a higher data rate in its downlink (2.4 Mbps) than it supports in its uplink.

### **Flexibility to Choose the Direction of Transmission**

The Commission seeks comment on whether, if a paired band plan is adopted, operators should be given the flexibility to choose the direction of transmission (base station transmit/mobile transmit) to be employed in each of the bands. They note that the typical operation with paired frequency bands supports mobile transmit (the uplink) in the lower frequency range and base station transmit (the downlink) in the upper frequency range. Lucent strongly supports a Commission Rule that mandates this traditional use of paired blocks for the 1.7 GHz and 2.1 GHz spectrum.

First, flexibility that permits operator choice could result in opposite directions of transmission in adjacent frequency blocks. Such an arrangement creates the potential for interference problems and would likely demand the use of more stringent out of band energy requirements, the use of lower power transmitters, and the designation of guard bands, resulting in the loss of useable spectrum. Second, the use of base station transmit in the upper frequency range (2110-2155 MHz) is potentially beneficial as it is consistent with the internationally accepted IMT-2000 band plan. The Commission has recognized harmonization of spectrum allocations can generate equipment economies of scale and facilitate international roaming. Accordingly, for paired spectrum used with FDD systems, the use of the higher frequency band for base station transmit and therefore, the use of mobile transmit in the lower frequency band should be prescribed.

At the very least, even if non-typical operation (i.e., directions of transmission) is desired for some other reason, flexibility should be disallowed to avoid the uplink/downlink interference problem that can occur in adjacent frequency blocks.

### **Out-of-Band Emissions Limits**

Lucent suggests that the out-of-band emissions limits similar to those set forth in Part 24 of the Commission's Rules should be applied to systems deployed in the 1.7 GHz and 2.1 GHz bands. The requirement that power be attenuated below the transmitted power (P) by  $43 + 10\log(P)$  watts should adequately protect most adjacent services. As the Commission notes, to the extent that some adjacent services may require additional protection, the Rules can be appropriately modified. Indeed, more stringent out-of-band emission limits have been designated not only to protect DARS from interference from

WCS but also to protect public safety services in the upper 700 MHz band from adjacent commercial services.

The Commission should take careful note of the procedures included in its Rules that describe the measurement of out-of-band energy. Lucent believes that the Rules must be written to assure that all system technologies used to provide advanced wireless services are subject to identical requirements, or requirements that are commensurate with all viable technologies, and that do not discriminate against any particular given technology.

It is likely that CDMA2000 and UMTS will be widely used in the 1.7/2.1 GHz bands. Although both employ spread spectrum techniques they are distinguished by their respective carrier bandwidths. Specifically, the carrier bandwidth for CDMA2000 is 1.25 MHz; the carrier bandwidth for UMTS is 5 MHz. In comments filed in response to the Commission's 2002 Biennial Review of its Rules, Lucent suggested that the rule describing the measurement procedure (§24.238) will subject the (wider bandwidth) UMTS system to emissions limits – in the 1 MHz immediately adjacent to the licensed band – that are 6 dB more stringent than those applied to CDMA2000, and proposed a modification to the resolution bandwidth that would eliminate this discrimination. The Commission should consider this modification in the adoption of rules for the 1.7/2.1 GHz bands.